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ABSTRACT

To attack the problem of reading deficiencies of inner-city school children, the investigators designed an intensive reading program. Thirty-two low-achieving sixth-grade children were assigned to experimental and control groups for 9 weeks. Materials were selected not only on the basis of their instructional usefulness but with regard for the students' psychological needs for success. In a special class each morning, the experimental group was given 165 minutes of intensive work in reading using Science Research Associates Reading Laboratories and teacher-devised materials and behavior modification techniques. One teacher and two student teachers worked independently with and were accountable for five students each. The reading subtests of the Metropolitan Achievement Test which yielded significant results in favor of the experimental group were Word Knowledge and Reading Comprehension. According to results of some informal reading inventories, the experimental group gained 1.78 years and was significantly superior to the control group. Since many useful ideas were incorporated into the program, it was not determined which ones were responsible for these gains. Further research is currently underway in which specific treatments are used with greater numbers of children. Tables and references are included. (DH)

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Effective Remediation for Low Achievers in Reading[1]

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The improvement of students' reading abilities is on the current list of priorities of the major cities in the United States. This report is a detailed record of an intensive program designed to improve reading skills for low-achieving children in the inner city, co-sponsored by the School District of Philadelphia and Temple University. The purpose of the study was the development of a portable and inexpensive program to reduce reading deficiencies. An additional objective was the formulation of techniques that could be easily replicated because new student teachers and teachers would be involved in successive cycles, and no training time would be available. This paper presents the specific details of our program, the results, and the areas we believe need improvement.

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RE003 145

Sample

The sample consisted originally of 32 low achieving sixth grade children selected on the following criteria: (1) IQ score of 75 to 95 on a Lorge-Thorndike Test administered 21 months before the program began, and (2) score of fourth grade or below on the reading comprehension subtest of the Iowa Test of Basic Skills administered the previous May when the students were in the fifth grade. The 15 students who were randomly selected for the experimental group attended special classes during the entire morning for nine weeks; the remaining students stayed in their classrooms. All 15 children selected for the experimental group remained in the program through the final testing period. Three students in the control group left the school during this period. The instructional period occurred during the February to June semester of the 1969 school year. Pretest mean scores for both groups are presented in Table 1.

Procedures

Selecting Effective Materials. The need for effective materials was the first problem encountered. It was decided that students could not be instructed using materials that they associated with failure. Rather than beginning at the instructional level (more often teachers start at the frustration level!), it was decided to begin at a point where success would be assured,

TABLE 1

PRETEST MEAN SCORES FROM 1967-68

Group	IQ--1967	Iowa Test of Basic Skills--May 1968		
		Vocabulary	Reading	Arithmetic Concepts and Problems
Experimental[a]	86.07	3.43	3.53	3.91
Control[b]	82.43	3.43	3.40	3.49

[a] n = 15

[b] n = 14

so that the classroom would be associated with satisfying experiences. The selections had to be short, all work to be completed at each session so that it could be checked by the teacher and children could have immediate feedback. Content had to be such that sixth graders would not be ashamed of nor resent it. In addition, materials had to be found to meet the needs of a program focusing on skills of comprehension and word attack, and the building of independent work habits. These problems were largely dealt with during a pilot project, the first cycle of the program. Immediately before the commencement of this study a two-week preparatory session was held for the project staff,

at which time the guidelines were set and materials assembled.

Time Allotments. The study lasted nine weeks. Children from the experimental group attended the center every morning and returned to their classrooms in the afternoons. The mornings were scheduld so that all students had timed work periods in structured reading (80 minutes), word attack practice (30 minutes), specific comprehension of inferential questions (30 minutes), and arithmetic word problems (25 minutes). While a student could progress at his own pace in all aspects of the program, some selections had to be completed at each level in order to gain practice at each level.

Program Components. Science Research Associates' (SRA) Reading Lab Ia was selected as the basic component for the structured reading, because it met the stipulated criteria. The materials in it are arranged in a box with reading selections in booklet form. There are 20 booklets at each level, and each includes a story, questions on the text, and word attack exercises. Responses are placed on special sheets, and students may check their work from answer cards which are also contained in the box. According to the Teachers' Manual, the reading level range of the Ia Lab is from grade 1.2 to grade 3.0. Since the materials began at a low grade level, a quota of three SRA cards daily was set as the expectation for each student. Despite the fact that the work became more difficult, students were able to maintain

this pace. Each child recorded his progress on a chart on public display in the room. Several students were doing five cards each day toward the end of the cycle and progressed to Lab IIb (reading level 3.0 to 8.0). For this additional work, students were rewarded with cognitive, social, and material reinforcers (to be discussed below).

Since the children were deficient in so many skills, and since SRA does not purport to be a complete reading program, additional work in word attack techniques had to be provided. Using the Teachers' Manual from the SRA Labs as a guide, the staff developed a series of largely auto-instructional learning packets. The SRA booklets were analyzed so that the phonetic and structural skills taught in the reading selections were also stressed in the packets; e.g., if the recognition of the consonant blend "st" was emphasized in a SRA selection, exercises were found from existing sources (e.g., Continental Press) or were made by the teachers to reinforce the same skill. These extra work sheets were inserted into the Reading Lab booklets so that the reading (80 minutes) and word attack practice (30 minutes) became coordinated components. While the preparation of these packets was difficult for the staff, we believed that in combining these facets of the program there would be longer periods of concentrated attention and work. The pilot project prior to this cycle, in which packets were not prepared, was

characterized by much movement (sharpening pencils, visiting other groups). During the course of this research, however, persistency increased greatly; the working span of the students was lengthened as the weeks progressed. By the end of the nine week period, most of the students were able to pay attention to task throughout most of the 110 minute work period.

To teach reading comprehension beyond the factual level developed in the Labs, SRA's Reading for Understanding (RFU) was utilized. These exercises require inference from the selections and are arranged on color-cued cards indicating level. There are four cards at every interval with 10 items on each card, so that there are only 40 items at each difficulty level. Each item consists of a sentence with four alternatives for completion. In the early selections only one obvious answer is correct; however, as the vocabulary and concepts increase in difficulty, several choices might appear logical, although still only one is correct. The range of RFU is reported as grade 3.0 to grade 8.0; few children could go beyond the first 40 exercises. Consequently, the teachers had to devise additional exercises. The RFU model was employed, and for motivational purposes the names and activities of the children were inserted into the stories we prepared. Since the RFU program segment was scheduled after recess, at the end of the morning, the children's attention span and performance varied from day to day. Students completed

from one to three cards daily.

In order to satisfy the requests of the homeroom teachers as well as the objectives of the school district, arithmetic was included in the program. However, since the purpose of the Center was enhanced reading achievement, we focused on arithmetic word problems. Materials were selected from existing sources (e.g., Harcourt, Brace and World, Milliken Press) and were separated and organized developmentally into a series of 75 work sheets. Each contained word problems that used simple operations in addition, subtraction, and multiplication. Initially teachers assumed that the children knew such terms as "minus" and "difference"; however, this was not the case. Therefore, during each lesson, the teachers circulated, teaching terminology and concepts individually when necessary.

Personnel. One regular teacher and two student teachers were assigned to the center, and each was responsible for working with five randomly selected children in a separate area of the room. All instruction took place in these five-student units, and there was little or no interaction between groups. Although the ratio of only five students to a teacher does not approximate a normal classroom, it should be noted that the use of student teachers provided no increase in costs. Teachers kept records of the work completed and were available for answering questions, checking work, and supervising the children, who got their own

materials from the file cabinets. Teachers did no whole-class instruction but worked with the children independently as the need arose.

The division of the "class" into three independent units was made so that each teacher was accountable for the five students who were assigned to her. Such accountability was particularly important for the student teachers who agreed, before entering the program, to accept a grade for student teaching based on the posttest achievement scores of her students as compared with scores of the control group.

In order to have teachers implement the aims of the Center and to foster the idea of accountability, teachers graded the pretests (Metropolitan Achievement Test, MAT) for their own groups. They also had access to the tests during the instructional period and were encouraged to go over the material with the children. Since it had been ascertained in advance that none of the items in the pretest appeared on the alternate form used as a posttest, we did not consider these procedures "teaching the test," but rather focusing on the cognitive processes measured by the test. The teachers helped children practice in working with the format of the test and in deciding upon correct answers. Informal Reading Inventories (IRI) were also given at two week intervals to the children in the experimental group for diagnostic purposes.

Although teachers helped to set the performance criteria,

they were not given explicit directions as to how these criteria could be achieved. Thus, each teacher was free to handle the children in her group as she felt best. Generally the weekly meetings of the staff and investigators focused on students who were not achieving these daily criteria and on procedures which might help them. Teachers used their own insight and judgment with regard to daily assignments and rewards. The investigators, however, spent at least three sessions weekly at the Center in observation and consultation.

Behavior Modification Techniques. In addition to stipulated materials, a low teacher-pupil ratio, and accountability, treatment included the use of behavior modification techniques. These were instituted in order to pair working with positive reinforcers and to build in a capacity to sit and work for increasingly longer periods of time.

A token reinforcement plan was devised in which students received points for persistency and accuracy, i.e., after a 30-minute activity a student could earn 30 points for working. He could also earn bonus points, given at the discretion of the teacher, for exemplary work and effort. These points could be turned in weekly for goods from the store (e.g., comic books, candy, models) whose prices were raised as the children became more productive. Points could also be saved for more than one week in order to buy costlier items.

A reinforcing game area was organized that included activities such as Scrabble, Phonics, Quizmo, etc. This section of the room was used by all children, regardless of group, only when they completed a work period. Therefore, at three times during the morning, the game area was open. Points were not given for time spent at the games. The children, then, had the option of continuing work and receiving points or of playing. Most of the children chose to play.

Although we did not collect systematic data, it appeared that earning points became less important as the program progressed. For example, most of the children did not "cash in" their points each week but saved them for the larger items. At the start of the program, the children would show the investigators the number of points they had earned; as the program progressed they showed us the charts which indicated the number of packets they had completed. Moving from the "green level" to the "red level," for example, appeared to become a reinforcing experience.

Results

Testing Instruments. Inspection of the scores on the Iowa Tests of Basic Skills indicated that the students were almost exclusively in the lowest 10 percentile in the reading test. Several students had the lowest possible scores, and therefore the ITBS scores may have been an inflated estimate of their ability. In order to obtain a more realistic estimate of their

initial ability, tests designed for lower grade students--or "out-of-level" tests--were administered. The Metropolitan Achievement Test (MAT) Intermediate Level, Form A, was chosen. Two weeks before the program began, subtests in the MAT were administered, including word knowledge, word discrimination, reading comprehension, arithmetic computation, and arithmetic problem solving and concepts. In addition, an Informal Reading Inventory (IRI) based on the Harper and Row reading series was administered. The Brookover Self-Concept Inventory, a short test in which the subject is asked to assess his capability in various academic areas was also administered, orally, before the program began. At the end of the nine week program, the following posttests were administered: Form B of the MAT, an IRI using new selections from the same readers, and the Brookover Self-Concept Inventory.

In-grade and Out-of-grade Tests. Because tests from different publishers and tests which were in-grade and out-of-grade were administered to the same students, it is possible to inspect the scores and guess as to the causes of the differences. On Table 2 the results in reading using the in-grade ITBS scores are compared with those obtained nine months later using an out-of-grade MAT test. On Table 3, similar subtests in arithmetic cam be compared.

In every case in the reading areas, the subtest score on

TABLE 2

MEAN SCORES ON ITBS (MAY 1968) AND MAT (FEBRUARY 1969) IN READING

Group	Iowa Tests of Basic Skills		Metropolitan Achievement Tests		
	Vocabulary	Reading	Word Knowledge	Word Discrimination	Reading
Experimental	3.43	3.53	3.09	3.33	3.19
Control	3.43	3.40	3.03	3.10	3.11

TABLE 3

MEAN SCORES ON ITBS (MAY 1968) AND MAT (FEBRUARY 1969) IN ARITHMETIC

Group	Iowa Tests of Basic Skills	Metropolitan Achievement Tests	
	Arithmetic Concepts and Problems	Arithmetic Computation	Arithmetic Concepts and Problems
Experimental	3.91	4.29	3.81
Control	3.49	4.26	3.29

the MAT--a test given nine months later than the ITBS and on a level below the students' grade level--yielded lower mean scores than the corresponding subtest scores on the in-grade ITBS. Of

course, any comparison of these scores is hindered because different tests and different levels were used. However, the higher results obtained using the on-level ITBS nine months earlier suggests that a basement effect may have been operating, and the ITBS scores may be an inflated estimate of the students' reading ability.

Metropolitan Achievement Test: Reading. The posttest on the alternate form of the Metropolitan Achievement Test was given at the conclusion of the nine-week program. Because of holidays and administrative details in organizing the center, almost three months elapsed between the administration of the first and second forms of the MAT. Details of the pretest and posttest results are presented on Table 4.

The mean gain in the experimental group far surpassed the three-month period from pretest to posttest, or the nine-week instructional period. Gains in months ranged from 4.8 to 7.2. The largest gain, in reading comprehension, paralleled the area which received strongest emphasis in the program. The gains for the control group were much smaller, ranging from 0.3 months to 2.8 months. Although the gains are large, it should be noted that at the end of the period the experimental students were reading only at the fourth grade level, but were about the enter seventh grade. Short term gains such as those obtained in this and similar programs can be labeled only as "promising but

TABLE 4

RESULTS ON READING SUBTESTS OF THE METROPOLITAN ACHIEVEMENT TEST

Subtest	Pretest G.E. Score	Posttest G.E. Score	Gain (in months)	Adjusted Posttest Score
Word Knowledge				
Experimental	3.09	3.73	6.1	3.66*
Control	3.03	3.06	0.3	3.15
Word Discrimination				
Experimental	3.33	3.81	4.8	3.72
Control	3.10	3.38	2.8	3.47
Reading Comprehension				
Experimental	3.19	3.91	7.2	3.85*
Control	3.11	3.24	1.3	3.30

*$p < .05$

insufficient" until students are brought to grade level.

The significance of the difference between the means was tested using analysis of covariance with three covariates: IQ,

the appropriate ITBS score, and the pretest score in each subtest of the MAT. The results were significant for word knowledge ($p < .05$) and for reading comprehension ($p < .01$).

Informal Reading Inventory. The School District of Philadelphia forms for the Informal Reading Inventory (IRI) from the Harper and Row basal reading series were used as pretests and posttests. Tests were given individually, and were administered by the same teacher. The experimental group gained 1.78 years as measured by the IRI (see Table 5). Compared to the control group, the posttest scores of the experimental group were significantly superior at the .001 level.

Although the students' initial IRI reading level was roughly equivalent to the initial level on the MAT, both groups made much greater progress on the IRI than on the MAT. As assessed by the IRI, the experimental group gained almost two years and was reading at the fifth grade level. In other studies in which both a standardized reading achievement test and an Informal Reading Inventory were used, greater gains were also reported on the Informal Reading Inventory. The disparity may be due to any number of causes: the unstandardized nature of the test, the individual administration, or the leniency of the examiner in accepting partially correct answers. Despite its obvious disadvantages, it should be noted that the IRI scores are greatly valued in school settings and are used for placement and reporting purposes.

TABLE 5

RESULTS ON THE INFORMAL READING INVENTORY

Group	Pretest	Posttest	Gain	Adjusted Posttest
Experimental	3.19	4.97	1.78	4.95*
Control	3.11	4.18	1.07	4.19

*$p < .01$

Arithmetic Achievement. Intensive study in arithmetic was not originally intended to be part of our program. However, the teachers of the students requested that arithmetic be included because this subject is taught in the mornings, during the time when our students were absent from their regular classrooms. A minimal amount of time was given to arithmetic instruction, and the gain ranged from 2.9 months to 4.9 months (Table 6).

The lack of significant differences between the mean scores of the two groups in this area may reflect the decreased emphasis which we gave to instruction in arithmetic. Yet, we were pleased with the mean growth of almost five months in arithmetic concepts and problem solving for the experimental group, and particularly pleased that this growth was in an area which required reading ability in addition to computational ability.

TABLE 6

RESULTS ON ARITHMETIC SUBTESTS OF THE METROPOLITAN ACHIEVEMENT TEST

Subtest	Pretest G.E. Score	Posttest G.E. Score	Gain (in months)	Adjusted Posttest Score
Arithmetic Computation				
Experimental	4.29	4.58	0.29	4.54
Control	4.26	4.45	0.19	4.49
Arithmetic Concepts and Problem Solving				
Experimental	3.81	4.30	0.49	4.12
Control	3.29	3.55	0.26	3.74

Self-Concept. No differences whatsoever were obtained on the Brookover Self-Concept Inventory. The mean scores on the pretest and posttest were almost identical for both groups.

Teacher Reports. Reports from the regular classroom teachers of the experimental group indicated that these children did show "great improvement" during the afternoon sessions. When asked to specify behaviors, their statements included "pays more attention" and "can read now." Unfortunately, no systematic observational data were obtained.

Additional Analyses. Because the students were in independent groups, an additional analysis was made by separating the growth obtained by the student teachers from that obtained by the regular teacher. These results (Tables 7 and 8) indicate that the student teachers consistently obtained the greatest growth, followed by the regular teacher, and then the control teachers. These results suggest that in this study, at least, the use of student teachers whose grade was contingent upon student performance facilitated student growth. The greatest growth, that of nine months gain in reading comprehension in a nine-week program, was obtained by the student teachers. However, no generalizations are possible because of the small number of teachers and students involved.

TABLE 7

GAIN IN READING SCORES ACCORDING TO TEACHER'S STATUS

Group	Word Knowledge	Word Discrimination	Reading Comprehension	Informal Reading Inventory
Experimental				
Student Teachers	0.67	0.67	0.91	1.6 yrs.
Regular Teacher	0.56	0.10	0.34	1.3 yrs.
Control	0.03	0.28	0.13	1.07 yrs.

TABLE 8

GAIN IN AR METIC ACHIEVEMENT ACCORDING TO TEACHER STATUS

Group	Arithmetic Computation	Arithmetic Concepts
Experimental		
Student Teachers	0.31	0.78
Regular Teacher	0.26	-0.10
Control	0.19	0.26

Discussion

Using a three-pronged treatment approach, i.e., materials, teacher/pupil ratio, and behavior modification plan, it is difficult to gauge which variables caused the performance gains. In themselves, programmed materials have shown significant results (Feldhuser, et al., 1970), low numbers have facilitated gain (Hawkridge, et al., 1968), and reinforcing desired behaviors has proven effective (Madson, et al., 1968; Clark and Walberg, 1968). The investigators are currently doing research in which specific treatments are in use for different periods of time with greater numbers of children.

Comparison with Previous Research. Reading retardation of children in urban environments has been consistently noted

in reports of scholarly journals, research reviews, and the mass media. Hawkridge, et al. (1968), have reviewed 43 programs for low-income populations and low-achieving students and have tentatively identified five elements which they believe characterize the successful programs. These are: (1) clearly stated objectives, (2) parental involvement, (3) individual attention to students' learning problems, (4) high intensity of treatment, and (5) training of teachers. Three of these elements, those regarding clearly stated objectives, individual attention to students, and high intensity of treatment, characterized our program.

Causes of Results. It is impossible to determine which of the many unique elements in this program may have been responsible for the results. We varied many elements, rather than one or two elements, because we wanted to learn if an intensive treatment incorporating as many potentially useful ideas as possible would be successful.

Diffusion within the School. We had hoped that teachers of regular classes within the school would incorporate a number of our ideas in their instruction. To this end we always invited teachers to visit our center, and on two afternoons provided a display of the materials which we had developed or bought. There was very little interest on the part of the school teachers. Our hope that the teachers, who were reported

to be interested in new ideas, would simply pick up materials we offered was illusionary. It should be noted, however, that the research was initiated concurrently with the opening of a new school facility, rather than as an addition to a school program. This study, then, provides a single example of the need for greater work with teachers if we expect them to introduce new materials and procedures into their classrooms.

Unfortunately, we do not believe we gave sufficient attention to the rest of the childrens' day. Although parents were notified by letter of the selection of children for the program, and 25 per cent came to an initial meeting, parents were not advised as to what they might do to strengthen either the desire to read, or reading skills at home. Contact with the parents was maintained through the "School/Community Coordinator" at a superficial level only. While it was the intention to hold weekly meetings with the homeroom teachers, this was achieved only twice during the cycle. In order for carry-over to be pursued, greater contact seems necessary.

One final word concerning laboratory programs seems warranted at this time. While the academic value to the experimental children was apparent, are efforts for so few children worth the time and expense? Although children made significant gains in reading, as beginning seventh graders they were still functioning at the fourth grade reading level. It

is our belief that pilot studies must be extended, not just in researching programs for larger numbers and extended periods within a special center, but throughout a school. Dissemination activities should be consonant with experimental work, so that a laboratory does not become a project resented and envied by teachers, but a place of sharing. Further research is already in progress in which these concerns are receiving consideration.

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